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The Field Artillery Battalion on the Nuclear Battlefield

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Final report 6 June 1975

A thesis presented to the faculty of the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas 66027

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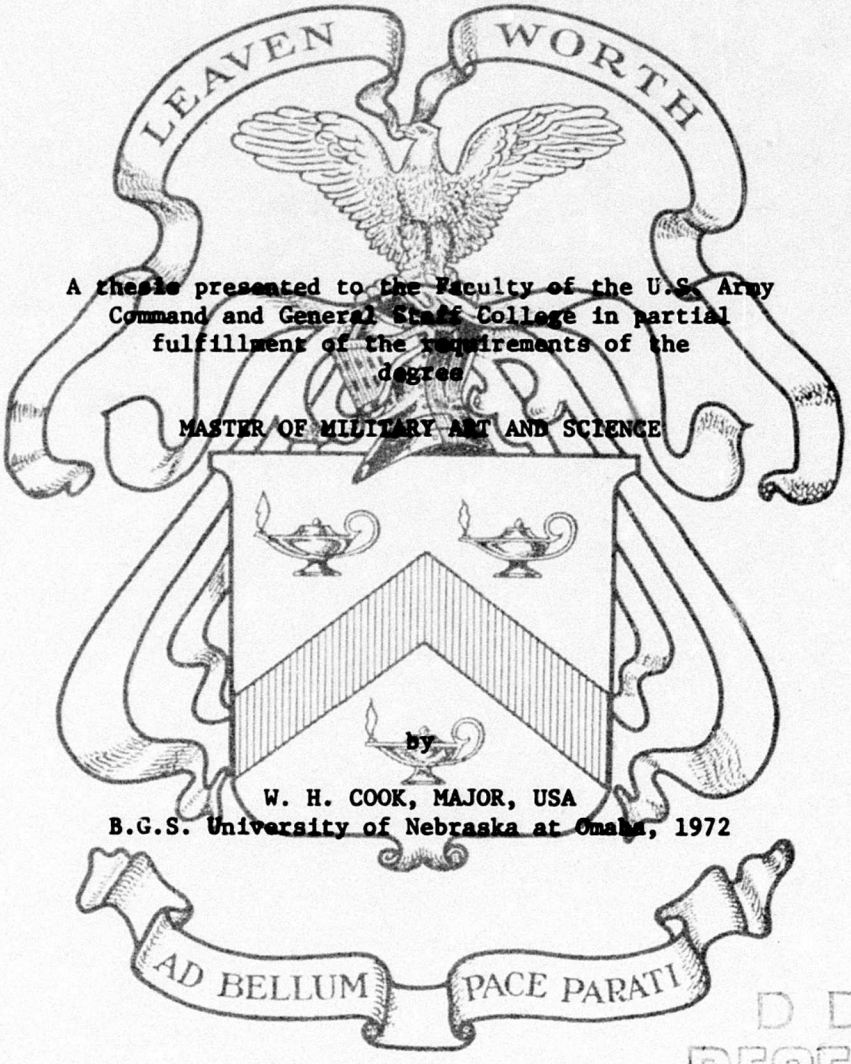
This research examines the organization of the field artillery battalion, 8", self-propelled, and its effectiveness in a tactical nuclear environment--European theater. The field artillery's requirements for accuracy, command and control, service support and target acquisition are discussed in detail. To determine the battalion's operational parameters particular emphasis is given to the enemy threat, divisional defensive operations and the field artillery techniques to support those operations. Further, it is ascertained that dispersion, responsiveness and austerity of units are of paramount importance on the nuclear battlefield and do impact upon the battalion's organizational effectiveness.

THE FIELD ARTILLERY BATTALION

ON THE NUCLEAR BATTLEFIELD



A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements of the degree

MASTER OF MILITARY ART AND SCIENCE

by

W. H. COOK, MAJOR, USA
B.G.S. University of Nebraska at Omaha, 1972

Fort Leavenworth, Kansas
1975

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Three possible battalion configurations are examined, weighing the advantages and disadvantages of each. These configurations are, in turn, compared to the current battalion organization. The comparison reveals that the current organization is capable, but inefficient. Additionally, it is found that many personnel and equipment assets are misutilized. Finally, an optimal battalion organization is proposed that eliminates the current inefficiencies without exceeding current manpower and materiel authorizations.

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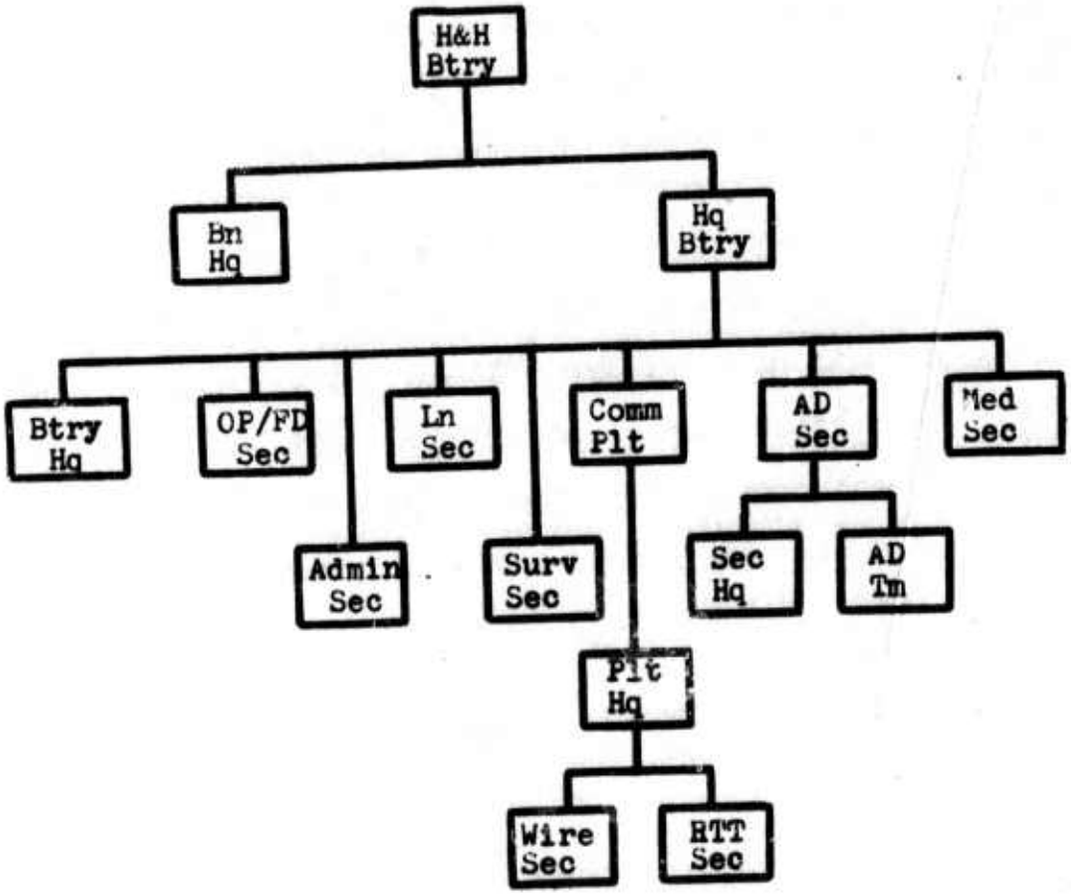

FIELD ARTILLERY BATTERY 8" SELF-PROPELLED
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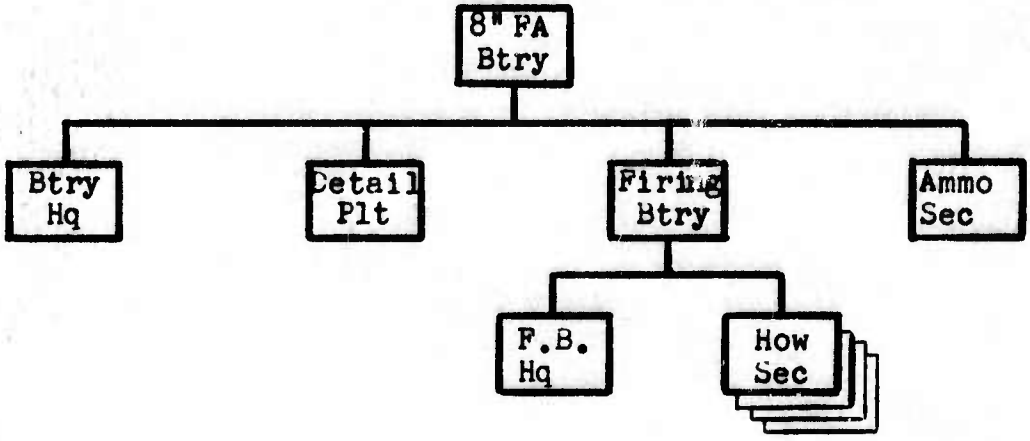

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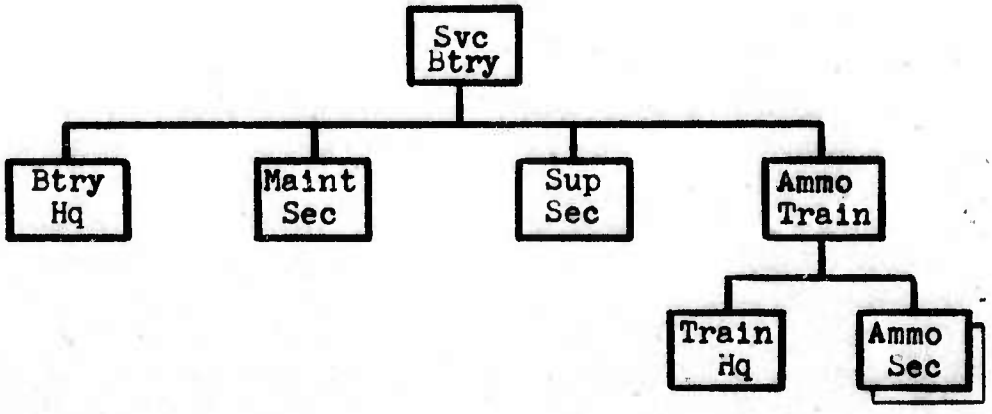


CHAPTER I

BASIS FOR CHANGE

Introduction

The basic mission of all field artillery organizations is to provide fire support to the ground gaining arms. In order to accomplish this mission the field artillery must be responsive to two masters: those forces engaged in actual combat and the overall force commander. Therefore, to support a division, the field artillery must provide accurate and timely fire support to the combat battalions while at the same time responding to the orders of the division commander.

The organization of existing field artillery assets into a unit that will optimize supporting fires must be a driving force toward mission accomplishment. However, the unit thus organized must retain the flexibility to adapt to the vagaries of the battlefield and conform to the commander's tactical requirements, regardless of the division supported or the envisioned battlefield. It is virtually impossible to design any organization which is equally effective for all possible contingencies. Therefore, this study is limited to the most strategically important theater of operations---Europe.

Problem

To determine the optimal organization (Table of Organization and Equipment) of the field artillery battalion (8", self-propelled) in support of the armored and infantry (mechanized) division on a tactical nuclear battlefield in the European theater.

Rationale

Current international agreements, protocols and treaties, particularly N.A.T.O., present possibilities of nuclear warfare for which the United States Army must be prepared. Accordingly, the European theater was selected as the locale of a tactical nuclear conflict. Europe is the only location in the world where the United States daily faces a potential enemy of numerical superiority, and both forces are armed with nuclear weapons.

The 8", self-propelled field artillery battalion was selected for examination since it is common to the divisions currently deployed in Europe. Additionally, the armored and infantry (mechanized) divisions comprise the preponderance of U.S. Army combat forces.

Though the nature of warfare may not have changed since World War II and Korea, the battlefield has become increasingly complex. Today's weapons are more lethal and range farther. Forces are more responsive, strategically and tactically, than those of even ten years ago. Yet the years of technological

change have not seen any fundamental changes in field artillery organization.[1] The basic field artillery battalion--a headquarters and headquarters battery, a service battery and three firing batteries--has not changed for at least forty years.[2] In fact, there are striking similarities between today's battalion and the horse-drawn 75mm howitzer battalion of 1930.[3] It does not automatically follow that the current organization is obsolete. However, the organization's effectiveness on the modern battlefield is at least open to question.

Our Viet Nam experience demonstrated that there were shortcomings in the current organization--fire direction personnel strengths had to be increased, the artillery survey mission was redirected, and firing batteries approached logistical self-sufficiency. However, the prolonged Viet Nam conflict allowed time for a trial and error determination of the required organizational modifications.

It is uncertain whether a future European war would begin with nuclear warheads or whether there would be a transition from conventional to nuclear war. In either case, there would be little time to rectify organizational shortcomings. There is no history of tactical nuclear warfare to guide us. There are no volumes of "lessons learned" to prepare us. The field artillery units in Europe today must be fully capable of providing effective fire support during either type of conflict.

Scope

The purpose of this research is to examine the ability of the battalion, and all its essential sub-elements, to function effectively in a nuclear environment. The research is directed toward an organization capable of providing effective fire support to the division while in the normal role of General Support, General Support-Reinforcing or Reinforcing artillery.

The materiel analysis of the battalion will be limited to the distribution of currently authorized vehicles, communication's items and crew-served weapons. The personnel analysis will likewise be limited to the distribution of current personnel authorizations. This research will not analyze the usage of any specific item of equipment.

Assumptions

1. That the mission as currently stated in TOE 6-395H, will not change on the nuclear battlefield.

2. That any proposed organization, or changes to the existing organization, must not exceed the overall numerical manpower and personnel assets currently authorized.

Methodology

Chapter II is a discussion of the general requirements or functions that the battalion must fulfill in order to accomplish its assigned mission. Tables of the currently

authorized personnel and equipment assets are provided. Chapter III describes the threat, the envisioned battlefield of a division engaged in defensive operations and the field artillery techniques planned to support the operation.

Chapter IV discusses the field artillery battalion's operational requirements and examines a variety of possible battalion organizations, listing the advantages and disadvantages of each. Finally, Chapter V compares these organizations with the current battalion configuration and selects the optimal organization.

CHAPTER II

REQUIREMENTS

Mission

The mission as stated in the current TOE is as follows:

> To provide artillery fires, to include nuclear, in general support of an armored division or infantry division (mechanized); to reinforce the fires of other field artillery units.[1]

The battalion also has directed and implied responsibilities that must be met. Failure in any one area would seriously degrade the battalion's ability to accomplish its stated mission. Those responsibilities or requirements identified are only those considered to be the major or most significant areas.

Mobility

One hundred percent mobile in organic vehicles.[2] This statement requires the battalion to be able to carry all TOE items, the basic load of ammunition and all other supplies and equipment for combat at any one time.[3] The battalion's mobility must be at least equal to the mobility of the supported force.[4] The vehicles provided do give the artillery battalion the required mobility.

Command and Control

The battalion is required to provide its portion of the artillery command and control.[5] This in itself provides little or no insight into the necessity for command and control of the

battalion or of the subordinate firing units. There are two significant and distinct aspects of command and control. First, there is that portion dedicated to the administrative, logistical and tactical needs of the battalion. These needs are similar, if not identical, to those of any combat battalion. In essence, the commander must be responsive to the needs of his subordinates and of his superiors and must provide adequate support and tactical direction to the subordinate elements. In order to accomplish these tasks the commander must have a staff that is both effective and responsive while not becoming outsized or cumbersome.

The second aspect is that of fire control and coordination. This aspect does not conform to the chain of command standard of other units. A request for fire may originate at any combat element and may be passed directly to the delivery unit or may flow up the chain as high as division and then back down the artillery channels to the delivery unit. The exact flow of a particular fire request depends entirely on the type of fire requested and upon the mission assigned to the battalion. This breaking of the chain is required in order to provide timeliness in fire support. This does not mean that the chain of command is unnecessary. More precisely, the artillery battalion has a responsibility to provide a means of timely fire support to the supported force.

Communications

As with command and control, there are two distinct

communications requirements for the artillery battalion: communications with the supported force and communications with the next higher artillery headquarters. These requirements generate two communications systems that are complimentary and each provides the other a limited backup.

Today's tactical radio nets provide a rapid means of communications and are the simplest to establish. However, the current Soviet emphasis on ECM and neutralization of artillery, once located, preclude radio from being the sole communications medium. Additionally, the danger of electromagnetic pulse (EMP) "blackouts" and possible EMP damage to radio sets dictate that other means of communications be established to act as either the primary means or as a backup to radio communications.[6] Tactical wire communications is the only current means available that has both the speed and flexibility of radio communications. The drawback to tactical wire communications is that the establishment and maintenance of the system is time consuming and necessitates the dedication of both men and materiel assets.

Tactical/Technical Fire Control

Tactical fire control is basically the commander's tactical employment of one or more subordinate firing units. This control includes establishing priorities of fire, selection of targets, designation of which unit(s) will fire and the allocation of ammunition.[7] The battalion commander is usually the lowest echelon of tactical fire control with the

division or corps being the highest echelon.

Technical fire control is simply the process by which requests for fire support are converted to firing data and commands for the weapons themselves.[8] Technical fire control is accomplished at the lowest echelon possible, and rarely occurs higher than battalion level.

Nuclear fire requests are generally controlled as exceptions to standard practice. Both technical and tactical fire control for nuclear weapons is accomplished at the highest level possible.[9] This means that the firing unit must have a certain built-in flexibility, the flexibility to respond to both conventional and nuclear fire requests from as many as three different agencies.

Maintenance and Logistics

The mobility requirement cannot be continuously fulfilled unless there is viable maintenance of the vehicles which provide the mobility. Likewise, inadequate logistic support would soon cause the battalion to grind to a halt due to a lack of ammunition, fuel or spare parts.

Without the M-110 howitzer the battalion cannot accomplish its mission. The failure of any other single type equipment may cause a serious degradation in the battalion's capabilities, but not the loss of mission effectiveness. Therefore, the howitzer should receive the primary focus of maintenance efforts. The capability to adequately maintain the

howitzer must then be either an integral part of the firing unit or readily accessible to the unit.

The logistics impact on the battalion's effectiveness is as important as maintenance. The requirement for ammunition, fuel and spare parts cannot be understated. The resupply of these critical items is vital to the battalion's mission accomplishment. However, the battalion must use its own vehicular assets in order to procure and distribute these supplies.[10] Often the distances between the supply points and the using units are extreme. Personal experience has shown that distances of 25km or more are common. This is primarily due to the current combat service support doctrine. That is, ammunition supply points located near the division rear boundry and service support facilities for the battalion normally located in the division rear area.[11]

All of these factors make it all the more imperative that the battalion's logistics element be designed to speed the flow to the using units. Because of the tonnages involved, especially ammunition, the logistics element of the battalion should be tailored with primary consideration given to Class I, Class III, Class V and Class IX supplies.

Target Acquisition

Currently there are two means with which the field artillery locates the enemy. The first is to provide a forward observer from the battalion to the committed combat battalions,

as is the practice of direct support artillery units. The second method is to provide the combat battalions and other target acquisition elements a communications link to the 8" artillery battalion.

Both methods have advantages and disadvantages and it is beyond the scope of this research to determine which is best. However, one must bear in mind that the forward observer method is expensive in manpower/equipment assets, while the communications method costs the battalion response time. Whichever method is utilized, it must be selected only after careful consideration is given to the trade-off between time and manpower. Both are expensive, particularly in combat.

Accuracy and Survey Control

All artillery weapon systems have their inherent inacuracies. However, through extensive engineering efforts these inaccuracies are constantly being reduced. Obviously the fewer the inaccuracies, or the smaller the dispersion pattern of the weapon, the greater the probability of effectively engaging any particular target. The increasing accuracy of modern artillery does not necessarily tell the whole story. There are those aspects of artillery accuracy that cannot, at least presently, be engineered away. The minute differences in the weight, size and performance of the propellant and the projectile affect accuracy. Temperature, humidity and wind can alter the projectile's trajectory significantly. While these are problems

that the engineers are unable to correct, through data collection and computation their effects can be minimized.

Accuracy then hinges upon any errors in determining the locations of both the weapon and the target. This problem has been partly solved by extending horizontal, vertical and directional control from a known point to the howitzer position. Currently, this is accomplished by artillery survey parties who must physically traverse the ground between the two locations. However, without accurate target locations, regardless of the accuracy of the howitzer locations, effective fires cannot be delivered.

The burden is then placed upon the target acquisition means for accuracy in reporting seen or detected targets. This in turn creates a requirement for accurately determining the location of the target acquisition means. Likewise, a requirement is created for reducing errors between the means and the target. A chain is thus created of potential inaccuracies--howitzer location, observer location and target location. Elimination of any one inaccuracy will reduce the probability of compounding the error and correspondingly bring the system closer to error-free. The ideal would be exact locations of each, however, the ideal is seldom achieved.

Resources

The total assets available to the battalion are broken down into two broad categories: manpower and materiel. Further,

in both categories only the total numerical assets within the battalion have been identified. The manpower assets, Table II-1 has been further divided into subgroupings of Officers and Enlisted with differentiation made between those personnel holding field artillery related MOS's and those personnel trained in other specialties.

The materiel category, Table II-2, has been limited to those major items of equipment related to mobility, communications and firepower. Items of equipment that are authorized on a personnel, position and or section related basis have been omitted in order to simplify the discussion of asset utilization.

Items of equipment in current development, such as the M110E2, Position-Azimuth Determination System (PADS), Tactical Fire Direction Center (TACFIRE) etc., are not considered germane in that those items will not influence the organizational discussion. Newer items will, of course, increase the speed, range and flexibility of the battalion, but are not now forseen to make radical changes upon the organization. Their impact upon the overall organization, however, should be studied once the items are fielded.

Table II-1

Manpower[12]

GRADE	FA MOS	NON-FA MOS	TOTAL
LTC	1	-	1
MAJ	2	-	2
CPT	10	1*	11
LT	11	2**	13
WO	-	2***	2
OFFICER:	24	5	29
CSM	1	-	1
1SG/MSG	7	2	9
SFC	4	12	16
SSG	22	24	46
SGT/SP5	25	49	74
SP4 thru PVT	201	139	340
ENLISTED:	260	226	486

Total Assets

OFFICER----------27
WARRANT OFFICER----------2
ENLISTED----------486

*---- Signal Corps
**--- 1 ea: Signal Corps and Air Defense Artillery
***-- 1 ea: Physician's Assistant and Automotive Maintenance Technician

Table II-2

Equipment

1. Vehicles

Nomenclature	Model	Total
Truck, Utility, ¼ton	M151	18
Trailer, Cargo (¼t.)		3
Truck, Cargo, 1¼ ton	M561	21
*Trailer, Cargo (¼t.)		1
Truck, Cargo, 2½ ton	M35A2	20
Trailer, Cargo (1½t.)		8
Trailer, Water		5
Truck, Van, 2½ ton	M109A	3
Truck, Cargo, 8 ton	M520	18
Truck, Wrecker, 10 ton	M553	1
Carrier, Cargo, 6 ton	M548	12
Carrier, C.P.	M517	5
Recovery Vehicle	M578	2
Recovery Vehicle	M88	1

2. Weapons

Nomenclature	Model	Total
Howitzer, 8", SP	M-110	12
Machinegun, Cal. 50	M2	15
Machinegun, 7.62mm	M60	31
Launcher, Grenade, 40mm	M203	39

*Trailers mounted with generators for AN/GRC-142 not included.

Table II-2 cont.

3. Communication/Electronics

Nomenclature	Model	Total
FADAC	M18	4
Radio Set	AN/GRC-142	5
Radio Set	AN/PRC-77	12
Radio Set	AN/VRC-46	23
Radio Set	AN/VRC-47	6
Radio Set	AN/VRC-49	1
Radio Set	AN/VRC-64	1
Remote Set	AN/GRA-39	18
Switchboard	SB-22/PT	8
Telephone	TA-264/PT	2
Telephone	TA-312/PT	86
TSEC	KW-7	5
TSEC	KW-38	18
TSEC	KWK-28	10

Chapter III

TACTICAL NUCLEAR WAR: EUROPEAN THEATER

The Threat

There are two threats which may be addressed. The first is the threat of an outbreak of hostilities in Europe. Although NATO and the Warsaw Pact deny any intention of initiating an attack, there must be some perception by both that the other may become the aggressor. Without such a perception both alliances become pointless. Numerous articles and books have been published that deal with the viability of the alliances, the probability of conflict, the politcal conditions which might lead to war and, if there is to be a nuclear war, who will commit themselves to first use.[1] This then is the political threat in Europe today. However, to those engaged in actual combat the politcal threat no longer matters. After the outbreak of war the commander must deal with the tactical threat.

If the political threat cannot be quantified, the tactical threat can. It is very easy to see that numerically Warsaw Pact combat forces far outweigh similar forces in NATO. A rough comparison shows that the Warsaw Pact holds a 3 to 1 ratio in combat power over NATO.[2] This superiority is in men, tanks and aircraft. In rather simple terms this means that each U.S.

division will face at least three Warsaw Pact divisions. Depending upon the type U.S. division and upon the mix of the Warsaw Pact divisions (tank or motorized), the enemy will have approximately a 2 to 1 superiority in men and 4 to 1 in tanks and artillery.[3] NATO holds a numerical superiority in only one aspect of combat power, tactical nuclear warheads.[4]

NATO's nuclear superiority on the battlefield does not necessarily equate to combat parity. The Warsaw Pact has two options in order to maintain superiority and preclude NATO's use of tactical nuclear weapons. The first is to match any nuclear use by NATO and to escalate with the same basic options presented NATO. The second option is to destroy, conventionally, NATO's nuclear delivery means prior to either side's first use.[5]

NATO has two counter-options. To protect the nuclear weapons and their delivery systems or to commit itself to first use of nuclear warheads. Of these, only the protection option would seem viable. This option, though, presents even greater challenges since the division's organic nuclear delivery systems are also the division's conventional field artillery. To utilize the divisional artillery in a normal fire support role means a greater risk in their detection and subsequent destruction.[6] Conversely, holding the artillery in a nuclear reserve means the loss of a major portion of the division's combat power.[7] The division commander must then carefully weigh the trade-offs between risk and protection, conventional and

nuclear fire power.

The Division Battlefield

A discussion or description of the divisional battlefield during a nuclear war can be only an exploratory exercise. History is replete with examples of the failure of armies to revise tactics in the face of new arms. However, history has never had to deal with any new arms as destructive as the nuclear warhead. Since there is presently no historical basis for nuclear warfare, the tactics to be employed must be derived from a logical expansion of current tactics.

Were a future European war fought without use of nuclear warheads, then it would follow that conventional tactics would be employed by both belligerents. However, the possible introduction of nuclear weapons by either of the opposing forces requires that both adopt different battle formations. Additionally, since the level of nuclear exchange cannot be predetermined, each commander must respond to the nuclear threat within his zone of influence.

Dispersion

Current tactical doctrine emphasizes the dispersion of friendly units to reduce their vulnerability to an enemy's nuclear weapons.[8] Depending upon the enemy's nuclear capability, the distance between adjacent companies would be approximately 2,500 meters.[9] When expanded to a divisional level,

the result is a frontage of anywhere between 36 and 50 kilometers with a comparable increase in depth.[10] In comparison, a division's frontage in World war II was approximately 6 to 10 kilometers.[11] Such wide frontages are, of course, planned for wars in which nuclear fires are the dominant feature of the battlefield.[12] However, should the battle revert to a non-nuclear or non-active nuclear environment, then the forces must be able to reduce their frontages or risk defeat in detail.

Task Organization

The exact task organization of the brigades within a division will, of course, be determined by the commander in relation to the assigned mission and the combat units available. However, the present day concept of combined arms teams, that is infantry heavy or armor heavy task forces, is extended to the nuclear battlefield.[13] This includes the positioning of combat support and combat service support units well forward with the brigades in the forward defense area.[14] Other support units are to be located deep in the division's rear area.[15]

Finally, current tactical doctrine emphasizes the mobility of combat forces.[16] This requirement becomes even more apparent in light of the wide dispersion of units within the division zone. Further, the need for mobility is not limited to those units engaged in combat nor to the reserves or counterattacking forces. The distances between units and their corresponding service support units places added emphasis upon mobility.

Unfortunately, there may be extended periods when nuclear weapon's effects will preclude effective movement.[17]

Movement

The increased distances between units on the nuclear battlefield, both laterally and in depth, will necessitate a corresponding increase movement on the battlefield. Maneuver units will have to traverse more terrain in order to close with the enemy. Likewise, logistical elements will have to contend with longer supply routes in order to maintain the combat units. However, due to the proliferation of ground surveillance electronics, any movement is subject to detection and therefore destruction. There are, of course, many active and passive countermeasures that will reduce the effectiveness of electronic surveillance. It is quite possible that these countermeasures will be able to mask the movement of combat forces or at least reduce the probability of an effective response.

Countermeasures alone do not solve the problem of movement, although they play a significant role. Another logical step would be to reduce the amount of vehicular movement within the division area. Since it would be foolish to sacrifice combat maneuver, the only alternative would be to reduce logistical traffic. This would require a decrease in the combat unit's dependency on external support. Such an increase in a unit's self-sustaining capability would certainly reduce the frequency of logistical movement, if not the quantity. The

units' increased logistics capability may also present an increased capability for prolonged combat. During periods when effective movement is precluded due to nuclear strikes, the probability of any unit exhausting its fuel and ammunition resources would be greatly reduced.

Any increase in a unit's logistics capability will certainly cause a corresponding increase in the size of the unit in both men and equipment. Therefore, care must be exercised in determining what changes are appropriate. Otherwise, any advantages envisioned will be more than offset by having a unit too large and too cumbersome to be employed effectively.

The Defense

Although tactical nuclear weapons may be used in both offensive and defensive operations, current NATO doctrine is based on a "forward defense."[18] This doctrine conveys the intent to "...defend all allied territory in Europe."[19] Additionally, revised U.S. doctrine intimates that tactical nuclear weapons would be employed just prior to the collapse of conventional defensive operations.[20] Neither NATO nor U.S. doctrines have precluded the use of nuclear warheads in attacks by fire or in counterattacks to restore the frontier. However, both doctrines do assume an initial defensive posture.[21]

Defensive Tactics

There are currently two accepted forms of defense: mobile

defense and the position or area defense.[22] Additionally, there are proposals for new defensive doctrines, the flexible defense, forward oriented defense or the attrition area defense. These proposals are hoped to be a doctrinal answer to the numerically superior threat in Europe and elsewhere. Anti-armor, air defense and urban combat tactics and techniques are also receiving great attention in an effort to provide greater understanding and expertise in future warfare.

In any case, the tactics to be employed in Europe cannot be predetermined. The commander will adopt a form of defense in keeping with his assigned mission, the terrain, available forces and the enemy threat. The defense may be single tactic or a combination of tactics, and may be on the standard or extended frontages previously mentioned. Therefore, it is readily apparent that all units must have the inherent flexibility to adapt to the tactical environment with no loss of combat effectiveness.

The problems of tactics, dispersion and movement may be further compounded by an envisioned change in command and control procedures; brigades controlling the conventional defense while the division and corps control nuclear assets.[23] The general support battalion must now be prepared to "...be placed under control of brigades for conventional fires."[24] In this regard, it would not be inconceivable to find one or more of the battalion's firing batteries attached to different maneuver

brigades.[25] Nuclear weapons employment will be directed by establishing "...direct communications between division artillery and the designated nuclear fire units."[26] For the field artillery, this dichotomy will mean even greater demands for organizational flexibility.

Field Artillery Techniques

The current fundamentals of field artillery tactics are sound. The nuclear battlefield should not present any parameters requiring major modifications of these fundamentals. However, revision of the artillery techniques practiced today may be required. The dispersion, movement limitations and command/control requirements of the battlefield already pose significant problems in mission execution. There is also the problem of survivability since the field artillery is first in priority for early detection and destruction by Warsaw Pact forces.[27] Therefore, the artillery must provide continuous conventional and nuclear fire support while concurrently remaining undetected and relatively invulnerable to counter-fires.

There have been various techniques proposed in an effort to solve the problems envisioned--the Split Battery, Dedicated Battery and the Silent Gun. In order to fully understand these proposals it is important to first discuss the techniques currently practiced. Although the discussion is limited to the firing battery itself, the role of the parent battalion cannot be overlooked. Therefore, bear in mind that the techniques are

those available to the battalion, not the firing battery.

Standard Battery

The term "standard battery" is used to characterize those tactical employment functions of the firing battery as currently practiced and tested. Basically, the firing battery accomplishes positional survey control, technical fire control, communications and its own self-defense, while providing a portion of the battalion's nuclear and conventional fire support means.[28] When employed as a part of the battalion, the standard battery has the means to accomplish a wide variety of employment techniques.[29] However, the battery is totally dependent upon the battalion for tactical fire control, logistics and the acquisition or designation of targets.

If the dispersion requirements are accurately forecast, then the distances between the battery and its battalion headquarters will place severe demands on communications alone. The distances may impact even more on the ability of the battalion to provide adequate logistics and maintenance support to the firing battery. Additionally, if a battery were attached to another unit, as proposed,[30] then outside (battalion) augmentation must be provided, thereby reducing the effectiveness of the battalion's support to the other firing units.

All of the aforementioned limitations are, primarily, those of command and control. As such, they can be identified and corrected as encountered. However, any correction of these

difficulties will not have solved the basic problem of survivability on the nuclear battlefield. The techniques described below are the results of efforts to cope with just that problem.

Dedicated Battery

This technique is simply an extention of the standard battery employment criteria into a hostile nuclear environment. The basic context is that the division would designate a certain number of firing units (batteries) as nuclear fire units. The units so designated would respond to nuclear fire missions only. It is logical to assume that these units would remain undetected until they had fired their nuclear missions; and that the destruction they had imposed upon the enemy would preclude any significant counter-fires. The major limitation to this technique is the reduction of available conventional fire support---as much as one third of the divisional artillery.

Split Battery

This concept is the result of an effort to reduce the artillery's vulnerability without sacrificing available fire support.[31] Basically, the firing battery disperses into two equal firing elements. The dispersion would thereby reduce the probability of destruction by a single nuclear weapon. While sound in theory, experiences in Viet Nam have demonstrated serious deficiencies in the employment of split batteries. Most serious is the lack of fire direction personnel and equipment

to conduct technical fire control at each element. If each element were to fire nuclear as well as conventional munitions, then additional manpower and equipment would be required for communications and security as a minimum.

Silent Gun

The silent gun technique is a blending of the dedicated and split battery concepts. Under this procedure each firing battery would dedicate a highly trained and selected gun section to the nuclear delivery role. The gun section, with a small command group, security and special weapons elements, would displace to an isolated firing position. The advantages of the split battery's dispersion and the dedicated battery's undetectability would be realized with this concept. Since fire control could be exercised at either battery, battalion or division artillery levels, the need for additional manpower would be minimal. However, there is a loss of conventional fire support availability.

"Shoot and Scoot"

This technique uses mobility to decrease vulnerability. As proposed, once an artillery unit fired a nuclear round it would rapidly displace to a new position to preclude counterfires. Shoot and scoot could, therefore, be a variant equally applicable to any of the artillery techniques previously discussed. However, when nuclear weapons are to be released as a

package, within certain time constraints,[32] the simultaneous movement of the artillery could present an attacker many lucrative targets.

Use of Artillery Techniques

The discussion of the various techniques available to the artillery is not intended to determine which option is best for the envisioned battlefield. Each technique has its inherent strengths, as well as weaknesses. The adoption of any particular technique will be dependent upon the commander's assessment of mission, enemy and terrain. Any one, or all of the techniques discussed, may be applicable to the situation and battle at hand. Therefore, the field artillery must be equipped, trained and organized to provide continuous fire support regardless of the tactics and techniques employed.

The Scenario's Impact on Organization

The basic field artillery requirements addressed in Chapter II and the preceding discussion of battlefield dynamics and proposed artillery techniques, demonstrate that the 8" battalion will face a wide range of contingencies. Concurrent nuclear and conventional operations, rapidly changing missions and extensive dispersion must not degrade the battalion's ability to provide fire support. The battalion must, therefore, be organized to meet the demands imposed by the tactical nuclear scenario. The major organizational criteria to be met are:

a. Exercise of positive command and control over subordinate units despite wide battlefield dispersion.

b. Ability to establish positive and redundant communications with higher, lower and supported force headquarters. Such communications must be established over long distances and should minimize vulnerability to the electronic warfare (E.W.) threat.

c. Provide responsive logistics and maintenance support to subordinate elements.

d. Organizational preparedness to execute non-standard missions.

Ideally, the battalion should be able to meet the criteria without requiring internal task reorganization. An organization cannot be designed to meet all possible contingencies. However, the 8" battalion must be organized to meet the most probable contingencies with minimum internal reorganization required.

CHAPTER IV

OPERATIONS AND ORGANIZATION

Since there has never been a tactical nuclear war, any discussion of the exact nature of such a war is open to challenge. Each writer, whether a journalist, military strategist or "expert" observer, has his own opinion as to the required force structure, tactics or even the probability of a nuclear war. The same writers do agree, however, that there will be a short, possibly even non-existent, transition period from conventional to nuclear combat. It is argued that with only a short transition period there will be no time to reorganize or re-posture for a nuclear battle.[1] Therefore, units must be organized and positioned for nuclear war without sacrificing conventional war capabilities. The units must be able to react to unforseen situations, losing neither responsiveness nor effectiveness. For the 8", SP battalion, this means a simple, flexible organization capable of providing immediate, accurate and sustained fire support during conventional or nuclear combat.

The battlefield dynamics and field artillery techniques used in combat are the challenges of a European tactical nuclear war. The field artillery's requirements for command and control, communications, target acquisition survey and service

support remain unchanged. What now follows is to adapt these requirements to the challenges.

Operational Parameters

Command and Control

The dispersion of forces and rapidly changing mission requirements will place unparalleled demands on the battalion's command and control system. These demands will be compounded if there are different echelons controlling nuclear and conventional assets.[2] Add the considerations of technical fire control for split batteries, or silent guns, and the problems become geometric. Currently, there are two separate, but parallel, systems for tactical and technical fire control. Although they do provide redundancy, a desirable feature, they often lead to confusion and errors. Most field artillery battalions have adopted the maneuver battalion concept---a tactical operations center---in an effort to eliminate the possibility of errors. The artillery battalion operations/fire direction center (FDC), becomes the focal point for both tactical command and control and technical fire control. All other staff elements depend on the battalion FDC as the single point for decision making. The battalion commander, higher headquarters and supported forces all feed information to the FDC and action follows. This adoption of an operations center is only by unit standard operating procedure (SOP), and

not by organization (TOE). The result, while more efficient and responsive, does waste valuable assets.

The firing battery fire direction center (FDC) is similar in function to the battalion operations center. Most significant activities, firing, displacement, warning orders, etc., are coordinated with the battery FDC as a focal point. Again, tactical and technical fire control consolidation at the battery level is a matter of unit SOP, not organization. Like the battalion, the battery FDC is short the required assets to function as an operations center.

The 8", SP battalion should have battalion and battery operations centers that, by design, consolidate technical and tactical fire control over subordinate units; provide direction to other staff elements; and respond to supported force and higher headquarter's commanders. This operations center must have the capability of continuous (24 hour) operations and provide a forward (jump) facility for short periods of time.

Communications

There is no change to the requirement to establish communications with higher, lower and adjacent headquarters. The methodology currently employed, however, is expensive in both manpower and materiel. It is common practice to lay dual wire lines between battery and battalion.[3] With the envisioned dispersion on a nuclear battlefield, this internal requirement alone equates to 36 miles of wire and two hours for installation.[4]

In a static defensive situation, wire installation would present few difficulties. Were the "shoot and scoot" technique to be employed, however, wire would probably be established too late to be of use.

The battalion's external wire nets are also laid with dual lines.[5] In this case, to division artillery and, when applicable, to the reinforced artillery unit. If nominal dispersion is considered, then the battalion to division artillery wire would cost 15 miles of wire and two hours for installation. Thus, the current wire nets require nearly 50 miles of wire for a single position---over two thirds of the battalion's total wire assets. Establishment of the current wire nets on a nuclear battlefield would be limited to either a single installation or require extensive wire recovery operations and resupply.

The number of intra-battalion wire nets could be halved and adequate wire communications would be retained. That is, establish wire between the battery operations center and the battalion operations center only. This would reduce the wire requirement by over one third and free wire personnel to conduct simultaneous recovery and laying operations.

Radio communications nets are, like wire communications, over redundant in some areas, while inadequate in most others. Currently, the battalion operates on three internal and three external FM radio nets. Of these, only one, the battalion

fire direction (F) net, is dedicated for providing fire support. This means that, using FM communications alone, the battalion can respond to only one mission at a time. This compares with three "F" nets for each direct support artillery battalion.

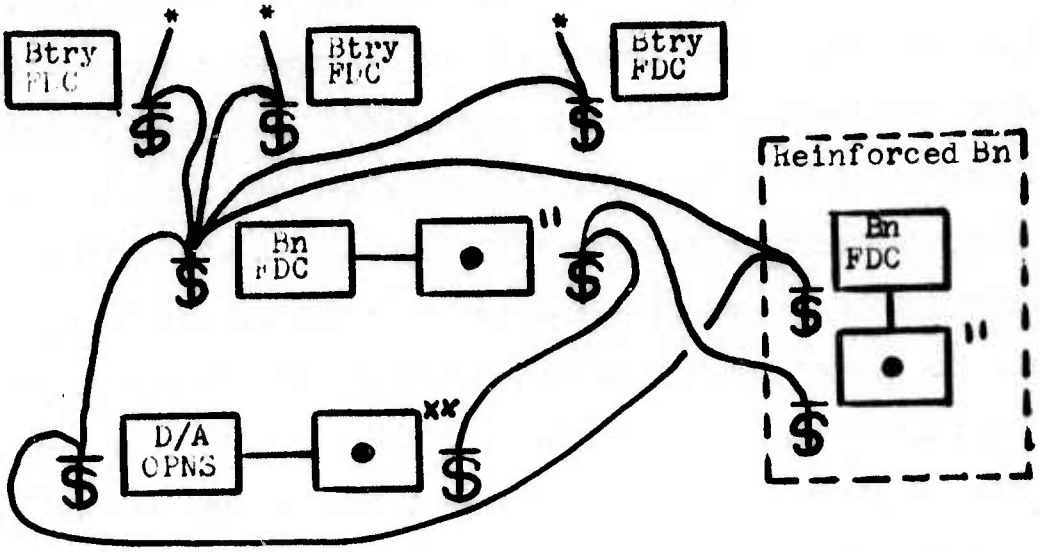
Of the remaining FM nets, one is for air defense, another for Corps Artillery survey and three others are combination command/fire direction (CF) nets.[7] Under ideal conditions, the battalion could receive three fire requests, but without wire, could only respond to two missions. Because normal CF net traffic is fairly heavy, the ideal of a free net would rarely occur. In an effort to reduce CF net traffic, most 8" battalions utilize an admin/log net for non-tactical traffic, although such a net is not authorized by doctrine.[8]

The final radio communications asset is the radio teletype (RTT) net. This net provides the battalion long range communications, normally to the fire support element at division, but is generally misused. Too often the RTT net is used for long, tedious and non-essential traffic.

The 8", SP battalion's radio nets must provide free and immediate access for conventional fire support requests; a separate and free channel for nuclear fire missions; and other nets as required to accomplish normal command and control. A suggested wire net and radio net diagram is shown in Table IV-1. The nets depicted would provide the required communications system.

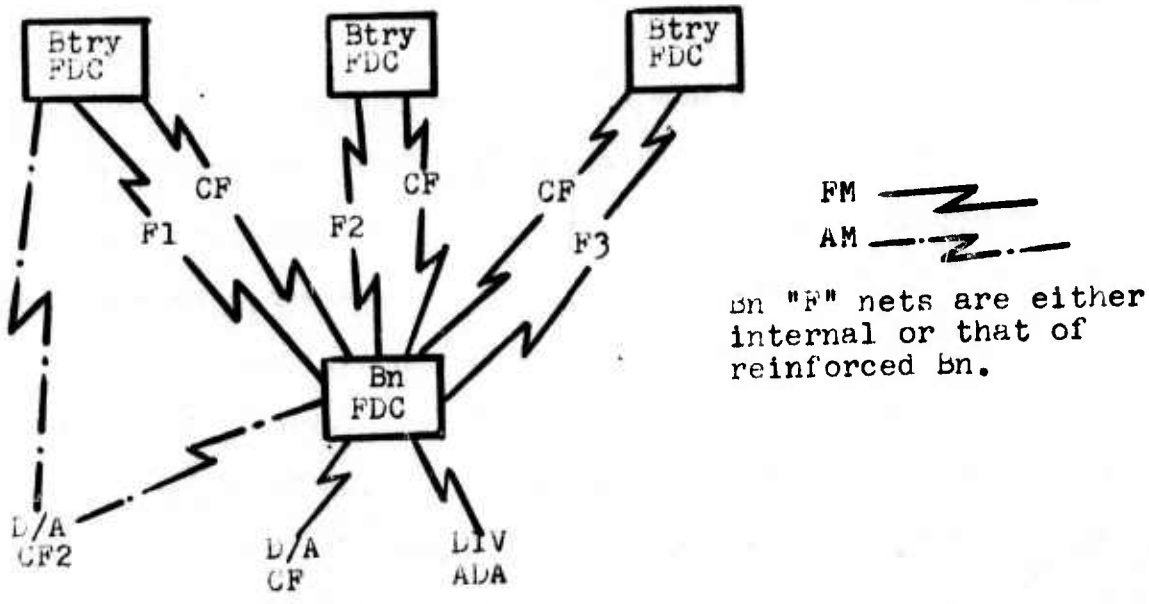
Table IV-1

A. Proposed wire nets: 8", SP battalion.



* To nearest unit, Bn. or Btry, of reinforced Bn.(Optional)

B. Proposed radio nets: 8", SP battalion.



Bn "F" nets are either internal or that of reinforced Bn.

Target Acquisition

The 8", SP battalion is not normally assigned a direct support mission and therefore has no requirement to provide forward observers to maneuver battalions. Maneuver battalions have their own organic, forward observers provided by the direct support artillery battalions. There are literally hundreds of target acquisition agencies within the division area. To assign forward observers to the 8", SP battalion would, therefore, be meaningless. Target acquisition capabilities would not be substantially increased and the cost of forward observer teams would be prohibitive.

The foregoing argument is true only if the target acquisition agencies are able to request fire support from the 8", SP battalion. The proposed radio net configuration (Table IV-1), would provide that capability.

Accuracy and Survey Control

There are two basic types of supporting fires provided by an 8", SP battalion---pre-planned and adjusted. Generally, the pre-planned target locations are determined by map spotting and not by survey. Even though pre-planned targets are normally located on easily identifiable terrain, such as a road junction, accuracy is relative to the accuracy of the map itself and of the individual determining the coordinates.

Adjusted fires are a much simpler, though time consuming mission. Whatever the inaccuracies in target location,

howitzer location or the weapon itself, all are relative only to the impact of the first round. After that, the ability of the forward observer is the determining factor.

Delivery of accurate, non-adjusted or pre-planned fires remains the unresolved problem. With few exceptions, pre-planned targets will continue to be fired on map-determined locations. The standard military maps (1:50,000) of Europe are extremely accurate and capable of providing coordinates to the nearest 10 meters. However, errors in map spotted target locations would, for the most part, range between 50 and 400 meters of the target's true location. There is little that can be done to eliminate these inaccuracies in the foreseeable future.

Howitzer location becomes a controllable factor. Elimination of positional errors will correspondingly reduce the inaccuracies in firing. Surveyed howitzer locations are the ideal. Unfortunately, most position areas, like target locations, are determined by map spotting. Although the 8", SP battalion is authorized survey personnel, the factors of time, terrain and distance often preclude establishing survey control. Periods of reduced visibility also reduce the efficiency of survey operations.

There is also a dichotomy in field artillery survey organization. Direct support artillery battalions are authorized two survey parties while the 8", SP battalion is

authorized five. Both battalions have the same general survey requirements. The 8", SP battalion positions are usually more dispersed; however, the total time-distances are comparable. Since the survey requirements are similar, it appears that the 8", SP battalion's authorized survey personnel should be comparable to the direct support battalion's authorization.

Control to the firing batteries could also be extended from one or more of the direct support battalion's survey control points (SCP). The current practice of a separate SCP for the 8", SP battalion is both time consuming and illogical.

Service Support

The application of the battlefield dynamics and the Army's logistical system to the organization of a unit is probably the most complex of any area of requirements. Most service support elements within the battalion are based upon either personnel or equipment densities. The reallocation of vehicles from one battery to another may also cause a personnel reallocation. For reasons of simplicity only, service support functions will be categorized as logistics and maintenance.

Logistics

The major logistics burden for the 8", SP battalion is provision of class III and V supplies. These classes comprise the greatest bulk and tonnage of supplies consumed by the battalion on a day to day basis. Since actual expenditures are

dependent upon the tactical situation---that is, distance traveled and rounds fired---any projection of daily demands is purely subjective. Certain consumption data is known, however, and can be expanded to reasonable requirements.

The battalion will consume approximately 100 gallons of class III for every kilometer traveled.[9] This is a conservative figure in that it does not include fuel consumed by vehicles for anything other than movement. It is not uncommon for a battalion to displace 30 kilometers per day. Therefore, at least 3,000 gallons of fuel must be resupplied daily.

The battalion's ammunition resupply rate is totally dependent upon expenditures which, in turn, are totally dependent upon the availability of ammunition. If, for example, an available supply rate of 75 rounds/tube/day is assumed, then the resupply requirement is approximately 105 tons per day.

With the tonnages and bulk of resupply required, primarily by the firing batteries, it does not appear feasible that a single battalion element can provide adequate service support. The firing batteries themselves must be provided with the assets for their own resupply under battalion supervision.

Maintenance

As with logistics, the maintenance assets within the batteries should be increased. Again, the dispersion of subordinate elements may render the current battalion maintenance section ineffective. Organizational maintenance can be

accomplished within the firing battery if the class IX supplies and trained personnel are available. However, the batteries are not now authorized, by TOE, to stock repair parts. The addition of parts stockage at battery level alone would significantly increase the batteries' maintenance capability.

Another step to increase overall maintenance efficiency and realize a simultaneous savings of manpower, would be to assign the battalion maintenance section a dual mission. That is, the normal battalion maintenance function plus maintenance for the section's parent unit.

Finally, the staff responsibility for maintenance, the battalion motor officer, should be assigned to the same unit as is the battalion maintenance section. If not, there is a broken and illogical chain of command and responsibility.

Self Defense

All batteries of the 8", SP battalion have sufficient individual and crew served weapons to provide self defense against a ground attack. There is, however, no air defense protection organic to the firing batteries which face the greatest air threat. A firing battery exposes itself to aerial observation every time it fires. Other elements of the battalion can utilize concealed positions that are unsuitable for firing and remain relatively free from aerial interdiction. The firing battery, since it is the most exposed target, should

have its own organic, air defense element; and this element must be tied into the divisional air defense warning net.

Organizational Concepts

Current Army policy states that unit development is "...the establishment of an organization whose major subordinate elements correspond to the functions which the unit must perform."[10] There are seven stated principles of organizational, or unit, design. Four of these are particularly appropriate for the problem at hand:

a. Break up the mission into its functional parts.

b. Establish organization relationships, using optimum span of control; eliminate as many layers, deputies, administrators and paper handlers as possible.

c. Allow for changes in mission or resources.

d. Emphasize essentiality, balance, cohesion, flexibility and efficiency.[11]

In essence, organizational design is accomplished by backward planning. Identifying and organizing the smallest functional elements possible and then building toward the total organization.

The optimization of the 8", SP battalion for European tactical nuclear war will follow these stated principles wherever practicable. However, the ability for the battalion to fulfill its assigned mission within the operational parameters will remain foremost in the organizational design effort. Consideration has been given to the battalion's TOE stated

capabilities and to the possibility of non-standard mission requirements.

Certain functional elements within the battalion have been identified as "modules." These elements are those whose personnel and equipment composition are not affected by the battalion's overall organization. The "modules" are held constant throughout the discussion of organizational configurations.

Additionally, the organizational extremes of one twelve-gun battery, twelve one-gun batteries and six two-gun batteries have all been discarded as impractical. The remaining permutations are discussed and the advantages and disadvantages of each are listed.

"Type" Battalion Organizations

Since the total number of howitzers cannot be increased, there can be no increase in available fire support quantitatively. Any increase in fire support will only be a result of increasing the availability.

Within the limitations of available assets, primarily the M110 howitzer, there remain three organizational combinations. The batteries have been configured into groupings of either two, three or four howitzers as the firing base. These densities permit the requirements for command communications and fire direction to remain constant. Therefore, the dependent variables are the service support elements of the battery.

All elements of the "type" battalion organizations have been designed with four additional major considerations: austerity, flexibility, simplicity and responsiveness. The result is three proposed organizations with an inherent ability to accomplish all the field artillery techniques discussed.

Headquarters, Headquarters and Service Battery

The Headquarters, Headquarters and Service battery, Table IV-2, provides a common command and control element for all "type" battalion organizations. The organization incorporates all essential elements of the current Headquarters and Headquarters battery and of the Service battery into a single unit structure. This permits a central location for all battalion operations and support activities, while reducing the total manpower and equipment requirements for the two current, separate elements.

The major changes from the current organization are:

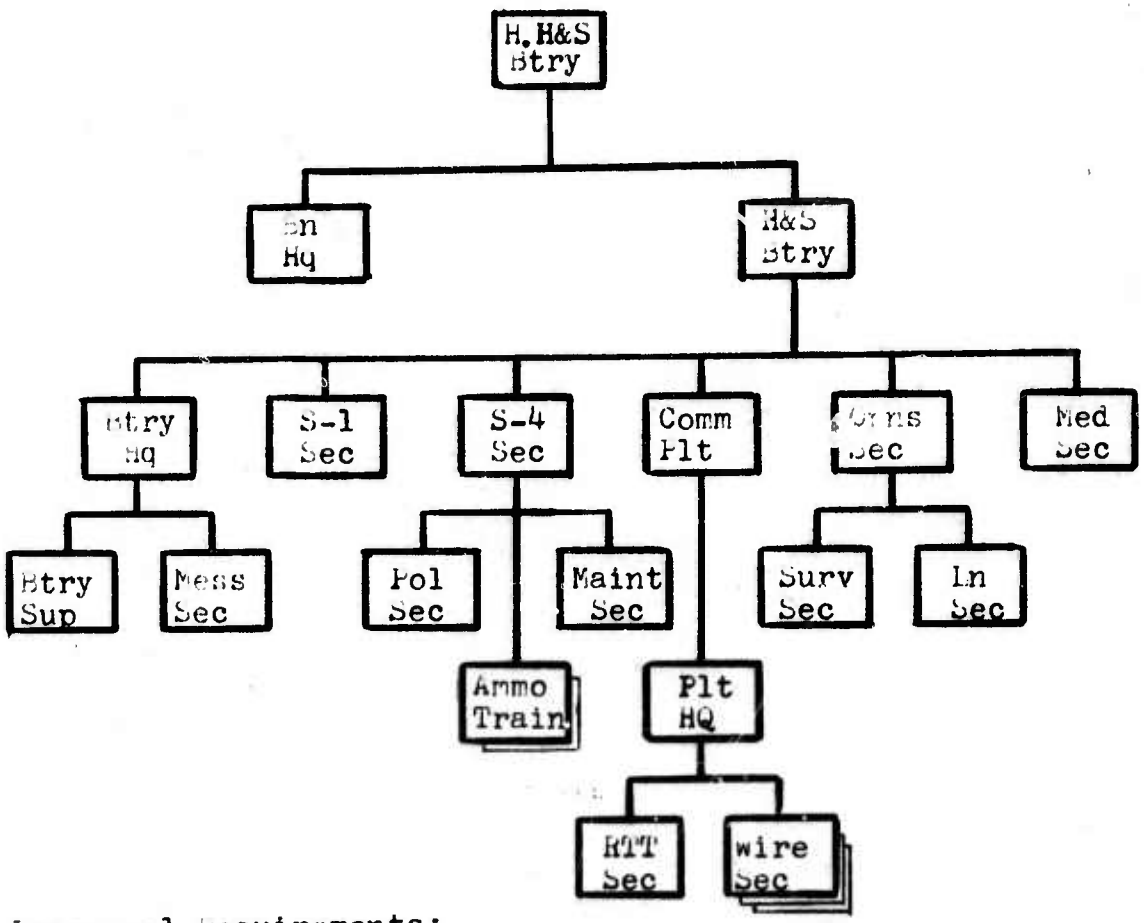
a. Establishment of an S-4 section with integrated ammunition, maintenance and petroleum elements.

b. Increase the strengths and capabilities of the battalion operations section to include incorporation of S-2 and S-3 functions; add an Air Defense staff officer; and provide for supervision of the liaison and survey sections.

c. Eliminate the battery maintenance section with the battalion maintenance section assuming organizational maintenance responsibility.

Table IV-2

HEADQUARTERS, HEADQUARTERS AND SERVICE BATTERY
FIELD ARTILLERY BATTALION, 8" SELF-PROPELLED
ARMORED OR INFANTRY (MECHANIZED) DIVISION



Personnel Requirements:

Grade	Strength	Grade	Strength
LTC	1	CSM	1
MAJ	2	1SG/MSG	5
CPT	8	SFC	4
LT	2	SSG	7
		SGT/SP5	24
Officer Total:	13	SP4-PVT	80
WO Total:	2	Enlisted Total:	121

d. Increase wire communications personnel and equipment from two to three teams.

Firing Batteries

Three "type" firing batteries have been organized. The major difference between the types is the density of the 8" howitzer, SP, in the batteries. The type "A" firing battery consists of 6 howitzers, type "B" 4 howitzers and type "C" 3 howitzers each. In all cases, the number of firing batteries is adjusted to bring the battalion to a total of 12 howitzers.

The type batteries do not represent a dramatic departure from the existing firing battery organization. However, those changes considered significant are:

a. Elimination of the firing battery survey section.

b. Increased strength of the battery fire direction center commensurate with the requirements for sustained operations.

c. Assigning an organic Air Defense (Redeye) team to the firing battery.

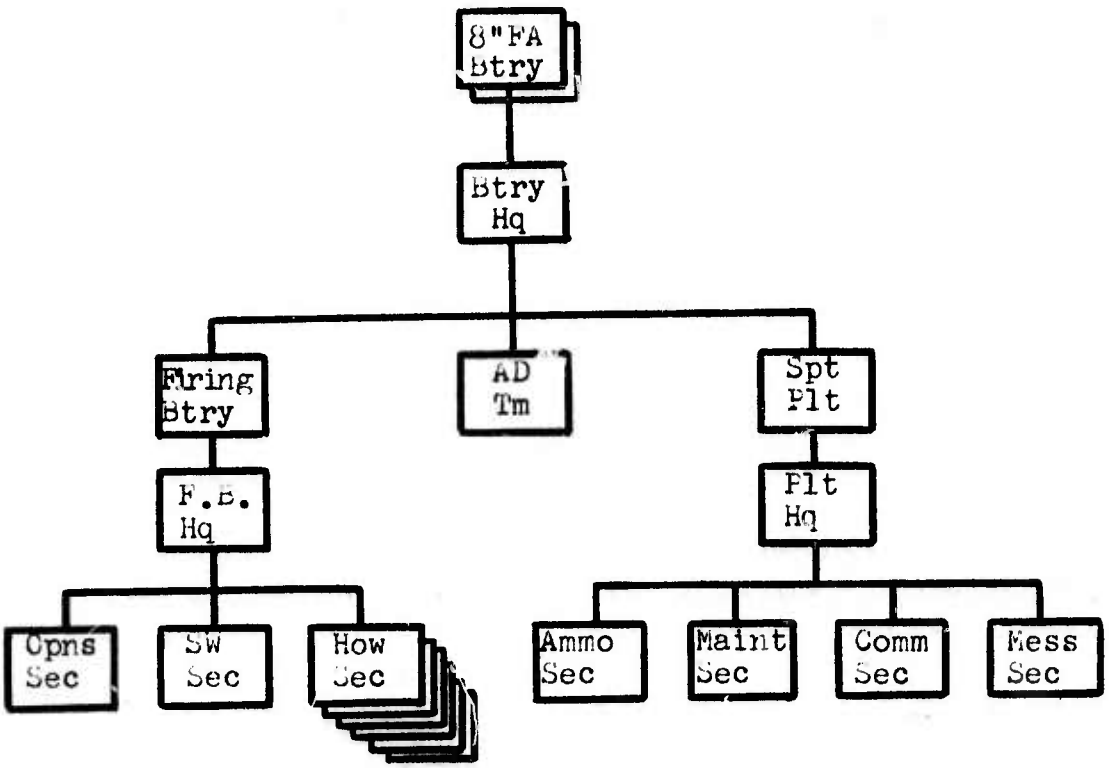
The organizational schematics for type firing batteries and their requirements are contained in Tables IV-3 through IV-5.

"Type" Battalion Comparison

The three "type" battalion organizations have common organizational elements for command and control, communications,

Table IV-3

FIELD ARTILLERY BATTERY, 8" SELF-PROPELLED
FIELD ARTILLERY BATTALION
ARMORED OR INFANTRY (MECHANIZED) DIVISION
(TYPE "A": 2 Batteries of 6 Howitzers Each)

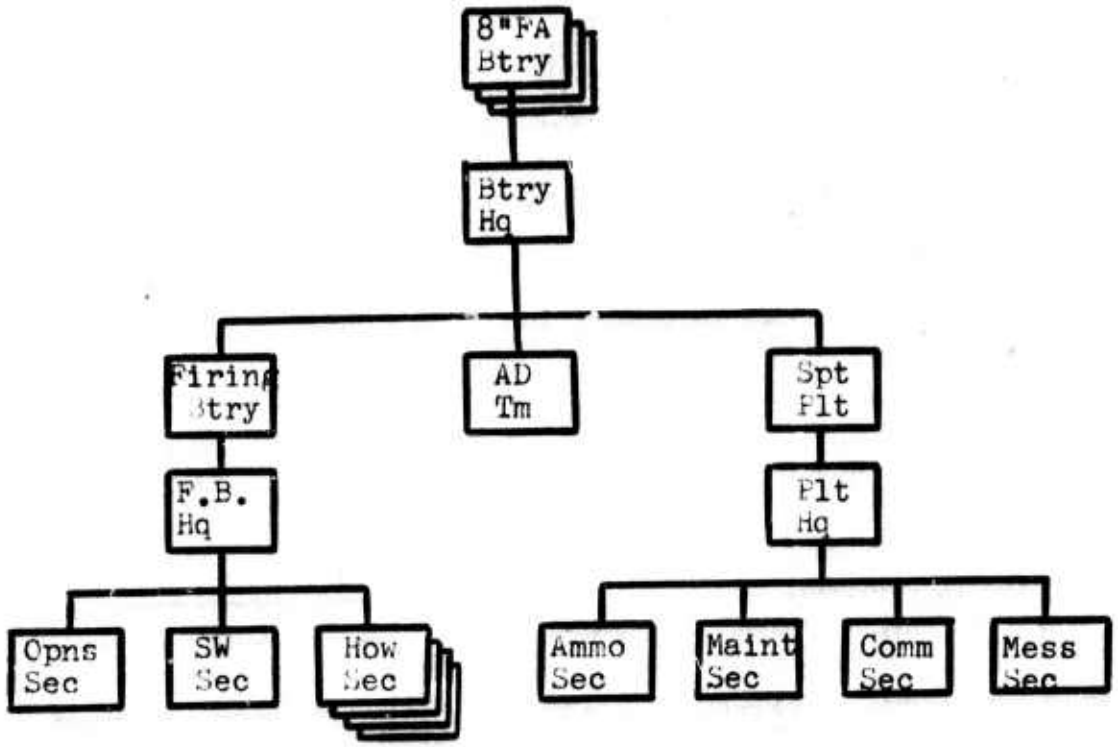


Personnel Requirements:
(Each Battery)

Grade	Strength
CPT	1
LT	3
1SG	1
SFC	2
SSG	11
SGT	16
SP4/PVT	114
Off. Total:	4
Enl. Total:	144

Table IV-4

FIELD ARTILLERY BATTERY, 8" SELF-PROPELLED
FIELD ARTILLERY BATTALION
ARMORED OR INFANTRY (MECHANIZED) DIVISION
(TYPE "B": 3 Batteries of 4 Howitzers Each)

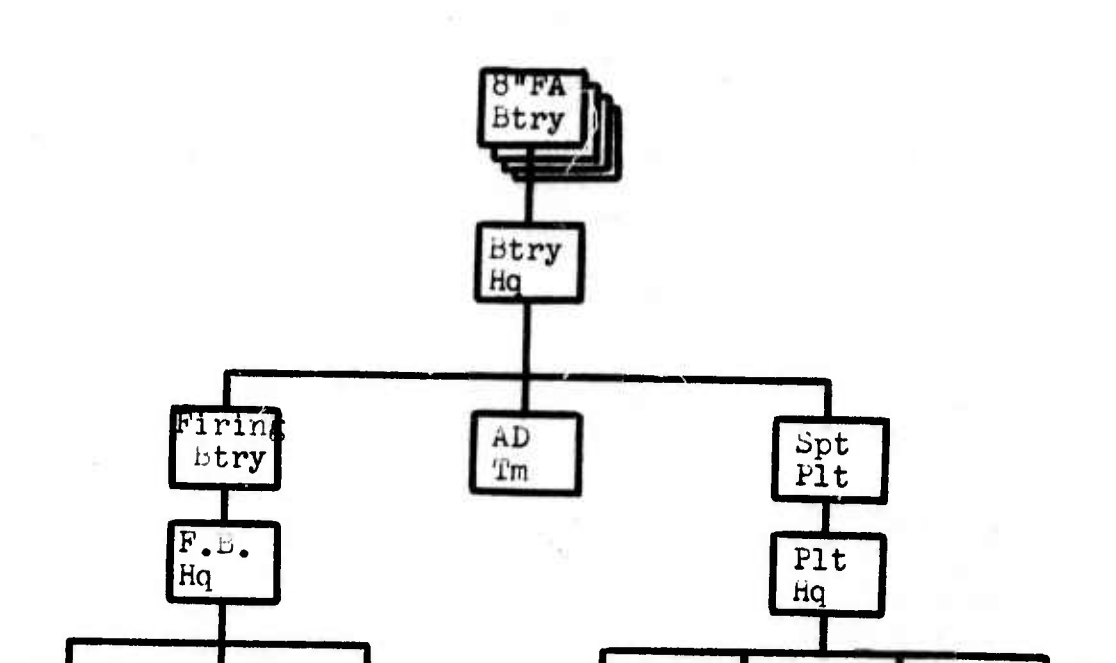


Personnel Requirements:
(Each Battery)

Grade	Strength
CPT	1
LT	3
1SG	1
SFC	2
SSG	9
SGT	13
SP4/PVT	85
Off. Total:	4
Enl. Total:	110

Table IV-5

FIELD ARTILLERY BATTERY, 8" SELF-PROPELLED
FIELD ARTILLERY BATTALION
ARMORED OR INFANTRY (MECHANIZED) DIVISION
(TYPE "C": 4 Batteries of 3 Howitzers Each)



Personnel Requirements:
(Each Battery)

Grade	Strength
CPT	1
LT	3
1SG	1
SFC	2
SSG	8
SGT	12
SP4/PVT	70
Off. Total:	4
Enl. Total:	93

service support and administration. The variable between the three battalions lies primarily in operational capabilities, although there are significant differences in personnel and equipment densities.

The overall operational capabilities of the three battalions are basically the same. Their configurations primarily impact on the facility with which non-standard missions and varying techniques can be accomplished. Therefore, each of the three configurations have inherent operational advantages and disadvantages when compared with the other "type" battalions. Only those advantages and disadvantages considered most significant will be discussed.

Type "A" Battalion: Advantages

The most striking advantage of this battalion configuration is the overall savings of personnel and equipment. By reducing the total number of batteries within the battalion there is a reduction in the "overhead" or supervisory positions. There is also a corresponding decrease in the equipment required to support the overhead. Other advantages of the type "A" battalion are:

a. Greater mechanic per end item density.

b. Reduction of the battalion's span of control requirement.

c. Increased fire power per unit and, therefore, availability.

d. Easier to mass the battalion's fires.

Type "A" Battalion: Disadvantages

The major disadvantage of the Type "A" battalion is the inability to disperse, laterally, and maintain battery integrity. Consequently, there is an inability to cover the entire division battle area without requiring time consuming direction changes. Additional disadvantages are:

a. Higher concentration of firing elements and, therefore, a more lucrative counter-battery target.

b. Firing positions are larger and more difficult to conceal.

c. Reduction of available fire support during displacements.

d. Inability of the battalion to accept non-standard missions such as attachment of a firing battery to another battalion.

Type "B" Battalion: Advantages

With the exception of the elimination of the service battery, the type "B" battalion more closely resembles the current battalion configuration. Therefore, reorganization into the type "B" configuration would be simplified and employment in combat would represent little change from current concepts. Further, in comparison with the type "A" battalion, the following advantages are realized:

a. Greater lateral dispersion while retaining unit integrity.

b. Smaller, less lucrative, counter-battery targets.

c. Increased available firepower during displacements.

d. Better ability to accept non-standard missions.

e. More easily concealed firing positions.

Type "B" Battalion: Disadvantages

a. Reduced mechanic per end item density.

b. Increased battalion span of control.

c. More difficult to mass the battalion's fires.

d. Reduced firepower per unit.

Type "C" Battalion: Advantages

This battalion's most obvious advantage is the ability to disperse laterally; cover the division battle area; and maintain unit integrity. Other significant advantages are:

a. The smallest and least lucrative counter-battery target.

b. Easiest to conceal the firing positions.

c. Minimal loss of available firepower during displacement.

d. Greatest ability to accept non-standard missions.

Type "C" Battalion: Disadvantages

The major disadvantage of the type "C" battalion is increased equipment requirements to support the organization.

This disadvantage alone, may be an overriding factor. However, the other disadvantages are:

a. Increased span of control.

b. Most difficult to support logistically.

c. Most difficult to mass fires.

d. Reduced mechanic to end item density.

e. Reduction of firepower per unit.

The discussion of the advantages and disadvantages of the three type battalions and the illustration of personnel and equipment requirements are not the sole factors of the organizational process. All the battalions described are able to perform fully the mission and capabilities as assigned to the current organization. However, it remains to be seen which type battalion, if any, provides the best organization.

Chapter V

CONCLUSIONS AND RECOMMENDATIONS

Comparison with Current Organization

The 8", SP battalion, as currently organized, is a time proven unit. It has the ability to fulfill the mission and the capabilities as assigned by the Department of the Army. This is also true of the three battalion configurations previously described. Therefore, the four battalion organizations are relatively equal. This equality may, however, be only superficial on a tactical nuclear battlefield.

To compare the current 8", SP battalion with the three "type" battalions, certain overriding facets of a possible European nuclear war must be considered. Although there is no complete concensus on the exact nature of the envisioned battlefield, three factors are consistent---dispersion, responsiveness and austerity. Dispersion is vital for the survivability of the units and necessary due to the extensive frontages for either conventional or nuclear combat. Responsiveness of units at all echelons is mandatory because of rapidly changing mission requirements and troop positioning. Finally, austerity is important due to the ever increasing costs for personnel and equipment. These facets must, however, be

expanded to measure their full impact upon the 8", SP battalion organization.

Dispersion is not just the physical location of troops and the distance between adjacent units. Dispersion of vital installations and assets are also required. If dispersion of such assets cannot be feasibly accomplished, then a certain amount of redundancy must be built-in to effect continuous operations.

Responsiveness and dispersion go hand in hand. That is, responsiveness requires the ability to control and coordinate the efforts of all subordinate elements. This must be accomplished over great distances and with the possible loss of vital assets, such as intermediate headquarters. In order to provide responsiveness, the unit's chain of command must be simple and direct. Therefore, all firing units must be accessible to guidance and direction from elements other than their own immediate headquarters.

Austerity demands that units must be authorized only the minimum personnel and equipment required to accomplish the mission. Yet, there is a valid requirement the units must operate on a continuous basis, probably without full authorized strengths and equipment.

Since the physical assets of the current battalion organization and the three type battalions are constant, that is, 12 howitzers etc., then the comparison must be based upon the

relative efficiency of each organization. Therefore, the measure of efficiency is based upon each battalion's capabilities to perform under the impact of dispersion, responsiveness and essentiality. In order to draw any further conclusions as to the relative efficiency, identification of any shortcomings within the current battalion organization must first be made.

Command and Control

The current organization does not always provide for a simple chain of command. Two staff officers cross command channels during normal operations. Specifically, the S-4, a member of the battalion staff, is also the Service Battery commander. Each position demands full and constant attention. The motor officer is also a member of the battalion staff, yet his functional element, the battalion maintenance section, is organic to another unit, the Service Battery. In many cases the amiability of these two officers determines the efficiency of maintenance operations.

The chain of command is further complicated by an excessive span of control requirements for most battery commanders. Currently, the commander of the headquarter's battery has eight immediately subordinate elements and the firing battery commanders each have six. In both units, total control can be difficult even under ideal field conditions.

The battalion commander is likewise faced with an excessive span of control. In a fast moving situation, with rapid mission changes, continuous positive control over subordinate elements may not be possible.[1]

Communications

Generally, the current organization provides adequate personnel and equipment for the battalion communications requirement. There is, however, a distributuion problem of some assets that degrades communications efficiency. Most serious is the ratio of vehicles to personnel for the battery and battalion wire teams. The wire sections now constituted either have too many personnel or too few vehicles. The requirement for dispersion indicates that the latter is the case. By adding the appropriate number of vehicles, the efficiency of wire team operations is at least doubled.

Survey

The concept of each firing battery providing its own survey control is sound, but may be idealistic. In most scenarios the firing battery is neither close enough nor in position long enough for the battery survey party to extend control to the firing position. In those cases where the situation is static enough to allow battery level survey control, there is also sufficient time for the battalion survey section to provide control to the firing units. Essentially, the

battery survey party represents a squandering of valuable manpower and equipment.

Service Support

Although there are limitations imposed by the currently authorized equipment densities, the battalion's most significant service support problem is efficiency. First, there is no one staff element charged solely with service support. (The crossing of command channels by S-4/Service Battery commander and the battalion Motor Officer has been previously addressed.) Secondly, the elimination of class IX supply stockage at the battery level has caused a dual problem. The firing batteries often find themselves without the spare parts to accomplish organizational repairs. On the other hand, the battalion maintenance section is inundated by requisitions, stockage and transportation of an excessive number of spare parts. Finally, there is a propensity for firing batteries to out run the logistics elements.[2]

The current authorization for Air Defense (Redeye) teams is adequate. However, this element has only been authorized portable (AN/PRC-77) radios and one vehicle. If the air defense mission is to protect the battalion headquarters installation, then there is no loss of efficiency. If, however, defense of the firing batteries is desired, then the air defense organization is relatively ineffective. The limited range of the radios alone makes effective control by the Air Defense

officer doubtful.

Unit Co-location

It is common practice to co-locate the headquarters and service elements of the battalion when in the field. Doing so reduces the commander's span of control and permits a greater degree of flexibility and responsiveness. When the units are co-located, usually the battery messes will consolidate as will battery maintenance sections, switchboards etc.. The final result is an extremely large complex and redundant position area. A position area that is difficult to conceal and wastes manpower and equipment in "overhead" type activities.

Responsiveness

The current battalion configuration has the same fire support capability as any of the "type" battalions presented. The weapon systems limitation dictates that total available fire support remain constant. However, the total efficiency and, therefore, responsiveness of the battalion is questionable. Inadequate communications access to the battalion by supported units may degrade the timeliness of fires and reduce total availability of fires. Finally, the extensive span of control imposed on the battery commander slows response to mission changes and displacements.

Final Comparison

Any single comparison of the current 8", SP battalion

and the "type" battalions previously discussed would be misleading. Comparisons of advantages and disadvantages, personnel and equipment densities, and the operational merits of each organization must be made. While it is necessary to consider each category separately, the categories must not be accepted individually.

In addition to the previous identification of each battalion's advantages and disadvantages, comparison tables for the other categories of consideration are provided. An operational comparison, Table IV-1, details each battalion's effectiveness in several functional areas. It is recognized that the factors presented are unweighted and, therefore, perhaps idealistic. However, the evaluation of effectiveness is primarily subjective judgement and any attempt to weight the factors would lead to further subjective judgement and possibly bias.

The final categories for consideration are the personnel requirements and equipment densities. Table IV-2 and Table IV-3 provide detailed summations of the total requirements for each battalion organization.

Table V-1

BATTALION COMPARISON: OPERATIONAL
(Current Battalion Organization Used as Standard)

Factors	Type"A"	Type"B"	Type"C"	Current
Span of Control	+	+	=	=
Dispersion of Assets	-	=	+	=
Firepower during Displacement	-	=	+	=
Time/Space during Movement	-	=	+	=
Communications Access	+	+	+	=
Communications Redundancy	=	=	=	=
Ease of Logistical Support	+	=	-	=
Maintenance	+	+	+	=
Air Defense	+	+	+	=
Survey Control	-/=	-/=	-/=	=
Target Acquisition	=	=	=	=
Non-standard Missions	-	=	+	=
Responsiveness	+	+	+	=
Firepower Per Unit	+	=	-	=

Table V-2

REQUIREMENTS COMPARISON: PERSONNEL

	Battalion Strengths			
Grade	Type "A"	Type"B"	Type"C"	Current*
LTC	1	1	1	1
MAJ	2	2	2	2
CPT	10	11	12	11
LT	8	11	14	13
WO	2	2	2	2
CSM	1	1	1	1
1SG/MSG	7	8	9	9
SFC	8	10	12	16
SSG	29	34	39	46
SGT/SP5	56	63	72	74
SP4 thru PVT	308	335	360	340
Subtotals:				
OFFICER.....21		25	29	27
WARRANT OFFICER.....2		2	2	2
ENLISTED.....409		451	493	486
Total Strength:	432	478	524	515

* From Table II-1, p. 15.

Table V-3

REQUIREMENTS COMPARISON: EQUIPMENT

Equipment		Battalion Quantities			
Nomenclature	Model	Type"A"	Type"b"*	Type"C"	Current**
Truck, Util., ¼t	M151	14	17	20	18
Trailer, ¼t		2	3	4	3
Truck, Cargo, 1¼t	M561	17	21	25	21
***Trailer, ¼t		Ø	Ø	Ø	1
Truck, Cargo, 2½t	M35A2	14	17	20	20
Trailer, 1½t		10	13	16	8
Trailer, water		3	4	5	5
Truck, Van, 2½t	M109A3	2	3	4	3
Truck, Cargo, 8t	M520	18	18	18	18
Truck, wrecker, 10t	M553	1	1	1	1
Carrier, Cargo, 6t	M548	12	12	12	12
Carrier, C.P.	M577	4	5	6	5
Howitzer, 8"	M110	12	12	12	12
Recovery Vehicle	M578	2	2	2	2
Recovery Vehicle	M88	1	1	1	1
Machinegun, 50 Cal.	M2	15	15	15	15
Machinegun, 7.62mm	M60	28	31	35	31
Launcher, Gren.	M203	25	31	37	39
FADAC	M18	3	4	5	5
Radio Set	AN/GRC-142	4	5	6	5
Radio Set	AN/PRC-77	8	10	12	12

Table V-3 (cont.)

Equipment Nomenclature	Model	Type"A"	Type"B"	Type"C"	Current**
Radio Set	AN/VRC-46	15	20	25	23
Radio Set	AN/VRC-47	6	7	8	6
Radio Set	AN/VRC-49	1	1	1	1
Radio Set	AN/VRC-64	3	3	3	3
Remote Set	AN/GRA-39	12	15	18	18
Switchboard	SB-22	4	5	6	8
Telephone	TA-264/PT	2	2	2	2
Telephone	TA-312/PT	66	79	92	86
TSEC	KW-7	4	5	6	5
TSEC	KY-38	15	18	21	18
TSEC	KYK-28	11	14	17	10

*: Though some equipment densities do exceed the current authorization, the overall costs would be less.

**: From Table II-2, pp. 16-17.

***: Trailer, Cargo, (1½t) with generators for AN/GRC-142 are not included.

Conclusions

The examination of the European tactical nuclear environment has revealed two significant criteria. These are the requirements for unit dispersion and the ability to respond to rapid mission changes and direction from more than one headquarters. These criteria place severe demands on the 8", SP battalion, yet the field artillery's total requirements are not significantly altered. The artillery techniques of dedicated batteries, silent guns and split batteries are not radical departures from those techniques currently practiced or from those perfected during the Viet Nam conflict.

Since the European tactical nuclear environment neither significantly alters the total battalion requirements nor demands radical artillery techniques, no single or major deficiency in the current 8", SP battalion organization could be identified. Therefore, the battalion as presently configured is capable of providing effective fire support during tactical nuclear combat in the European theater.

Although the battalion is considered capable, the shortcomings in command channels, communications, logistics, maintenance and survey demonstrate that there is organizational inefficiency. In essence, the current 8", SP battalion is capable, but not optimal. However, the three type battalions have reduced, if not eliminated, the organizational shortcomings. By doing so, the type battalions are more efficient

organizations and therefore each approaches an optimum configuration.

The elimination of inefficiency was accomplished, primarily, through the reorganization of the headquarters battery and service battery elements into a single unit. The proposed headquarters, headquarters and service battery was held constant in all "type" battalion organizations. Therefore, on the basis of efficiency alone, all "type" battalions merit consideration for adoption.

The different combinations of howitzers per battery and batteries per battalion does alter each battalion's overall effectiveness. A synthesis of the preceding discussions of the type battalions yield the following general conclusions:

The type "A" battalion, consisting of a headquarters, headquarters and service battery and two firing batteries, realizes the most significant savings of personnel and equipment. However, these savings are offset by the battalion's inability to provide fire support over extended frontages while maintaining unit integrity.

The type "B" battalion, consisting of a headquarters, headquarters and service battery and three firing batteries, realizes personnel and some equipment savings. This battalion approximates the current organization which would simplify adoption.

The type "C" battalion, consisting of a headquarters,

headquarters and service battery and four firing batteries, would allow greater unit dispersion and would be, inherently, a more flexible unit. However, this battalion configuration greatly exceeds the current equipment authorizations and must, therefore, be rejected as a viable alternative.

In final analysis it becomes apparent that the type "B" battalion organization is the optimum 8", SP battalion configuration for the tactical scenario described. The proposed battalion presents a number of advantages over the current organization:

Reduced personnel and equipment requirements.

A more efficient and responsive command structure.

Reduced span of control at both battalion and battery levels.

Recommendation

The proposed 8", SP battalion organization should be considered for adoption. Unit design should be directed toward an Army wide standard and not any particular set of tactical conditions. However, the demands for unit dispersion, mobility and survivability in the European scenario are similar to the demands envisioned in other geographic areas.

Therefore, the 8", SP battalion optimized for European tactical nuclear combat does not represent a divergence from the principle of standardized units. When adopted, the proposed organization, as detailed in Table V-4 and Table V-5,

should not be limited to the European theater.

Other Findings

During the course of research for the examination of the 8", SP battalion organization, a number of shortcomings in Army doctrine came to light. Although these failings are beyond the scope of this research effort, they do deserve mention. It is hoped that by identifying these problem areas, future research efforts might be directed toward resolving the failings.

Survey Control: The survey parties organic to the division artillery are the only division assets capable of establishing survey control within the division area. Field artillery survey is dedicated to the establishment of a common grid to the firing and target acquisition elements of the division artillery.[3] There has been no effort to establish a common grid for all target acquisition means organic to the division.[4] Of particular interest are the ground surveillance radars, organic to the maneuver battalions. These assets are not tied into the field artillery survey system. It is doubtful that, without a common grid system, accurate unobserved fires could be placed on targets located by radars other than those organic to division artillery.

Direct Support Maintenance: The 8", SP battalion is habitually associated with a particular direct support maintenance company as are other elements of the division. This

affiliation leads to smoother and closer working relationships between the units and is an excellent concept. However, unlike the brigades and direct support artillery battalions, direct support maintenance for the 8", SP battalion is provided from the division rear area.

The discrepancy in the doctrine is primarily that of distance. The distances between the battalion and maintenance support are usually three times that of other units within the division (15-30km vs. 5-10km). Contact teams, while extremely effective, do not completely rectify the problem.

Ammunition Resupply: The current doctrine of one Ammunition Supply Point (ASP) per division, which is located near the division rear boundry, appears to be insufficient.[5] A single ASP for a division becomes an extremely lucrative target for long range fires and for air interdiction. Additionally, the distance from the ASP to the using units is excessive. Personal experience has found that a round trip ammunition resupply mission requires four hours or more. The battalion is capable of firing the entire authorized ammunition load, 100 rounds per howitzer, in four hours.

Table V-4

HEADQUARTERS, HEADQUARTERS AND SERVICE BATTERY

Paragraph 01, Battalion Headquarters
Personnel:

Position	Grade	MOS	Strength
Battalion Cmdr.	05	01193	1
Exec. Officer	04	01193	1
S-3	04	52162	1
Comm. Officer	03	00205	1
S-1	03	02260	1
S-4	03	04010	1
CSM	E9	00850	1
		Total:	7

Paragraph 02, Battery Headquarters
Personnel:

Position	Grade	MOS	Strength
Battery Cmdr.	03	02900	1
First Sergeant	E8	13850	1
Unit Clerk	E5	75B20	1
Lt. Veh. Driver	E3	13B10	1
		Total:	4

Equipment:

Nomenclature	Model	Quantity
Launcher, Grenade, 40mm	M203	1
Radio Set	AN/VRC-46	2
Radio Set	AN/VRC-47	1
Telephone	TA-312/PT	1
Truck, Utility, ¼t.	M-151	3
TSEC	KY-38	2
TSEC	KYK-28	1

Paragraph 03, Battery Supply Section
Personnel:

Position	Grade	MOS	Strength
Supply Sergeant	E5	76Y40	1

Table V-4 (cont.)

Position	Grade	MOS	Strength
Armorer	E4	76Y30	1
		Total:	2

Equipment:

Nomenclature	Model	Quantity
Trailer, water, 400 gal	-	1
Truck, Cargo, 2½t.	M35A2	1

Paragraph 04, Mess Section
Personnel:

Position	Grade	MOS	Strength
Dining Fac. Mgr.	E7	94B40	1
First Cook	E6	94B20	1
First Cook	E5	94B20	2
Cook	E4	94B20	1
Cook's Helper	E3	94B10	1
		Total:	6

Equipment:

Nomenclature	Model	Quantity
Machinegun, 7.62mm	M60	1
Trailer, Cargo, 1½t.	-	1
Truck, Cargo, 2½t.	M35A2	1

Paragraph 05, S-1 Section
Personnel:

Position	Grade	MOS	Strength
Personnel Stf. NCO	E7	75B40	1
Clerk Typist	E4	71B30	1
		Total:	2

Table V-4 (cont.)

Paragraph 06, S-4 Section
Personnel:

Position	Grade	MOS	Strength
Supply Sergeant	E7	76Y40	1
Supply Specialist	E4	76Y20	1
Supply Clerk	E3	76Y10	1
Lt. Veh. Driver	E3	64C20	2
		Total:	5

Equipment:

Nomenclature	Model	Quantity
Launcher, Grenade, 40mm	M203	1
Machinegun, 7.62mm	M60	1
Radio Set	AN/VRC-46	1
Truck, Cargo, 2½t.	M35A2	2
Truck, Utility, ¼t.	M151	1

Paragraph 07, Pol Section
Personnel:

Position	Grade	MOS	Strength
Section Chief	E5	64C30	1
Lt. Veh. Driver	E4	64C20	2
		Total:	3

Equipment:

Nomenclature	Model	Quantity
Machinegun, 7.62mm	M60	1
Tank and Pump Unit	-	2
Tank Unit (trlr. Mtd.)	-	2
Trailer, Cargo, 1½t.	-	2
Truck, Cargo, 2½t.	M35A2	2

Paragraph 08, Ammunition Train
Personnel:

Position	Grade	MOS	Strength
Ammunition Off.	02	04510	1

Table V-4 (cont.)

Position	Grade	MOS	Strength
Ammo. Sup. Sgt.	E6	13B40	1
Ammo. Sec. Chief	E5	13B40	3
Hvy. Veh. Driver	E4	64C30	6
Ammunition Agent	E4	13B10	1
Ammunition Clerk	E4	71B20	1
Ammo. Handler	E3	13B10	12
		Total:	25

Equipment:

Nomenclature	Model	Quantity
Launcher, Grenade, 40mm	M203	3
Machinegun, 7.62mm	M60	3
Radio Set	AN/VRC-46	1
Truck, Cargo, 8t.	M520	6
Truck, Utility, ¼t.	M151	1
TSEC	KY38	1

Paragraph 09, Maintenance Section
Personnel:

Position	Grade	MOS	Strength
Motor Off.	03	00600	1
Maint. Tech.	W1	631A0	1
Motor Sergeant	E8	63C40	1
SR Recov. Veh. Op.	E5	63F20	3
SR Track Veh. Mech.	E5	63C40	1
Generator Mech.	E4	52B20	2
Track Veh. Mech.	E4	63C20	4
Recov. Veh. Op.	E4	63F20	3
Pll Clerk	E4	76S20	1
Equip. Maint. Clk.	E4	71T20	1
Welder	E4	44C20	1
Wrecker Oper.	E4	63B20	1
Track Veh. Mech.	E3	63A10	1
		Total:	21

Table V-4 (cont.)

Equipment:

Nomenclature	Model	Quantity
Launcher, Grenade, 40mm	M203	2
Machinegun, .50 cal.	M2	3
Radio Set	AN/VRC-46	1
Radio Set	AN/VRC-64	3
Recovery Veh., Lt.	M578	2
Recovery Veh., Hvy.	M88	1
Trailer, Cargo, 1½t.	-	1
Truck, Cargo, 2½t.	M35A2	2
Truck, Utility, ¼t.	M151	1
Truck, Wrecker, 10t.	M553	1

Paragraph 10, Communications Platoon Hqs.
Personnel:

Position	Grade	MOS	Strength
Commun. Chief	E8	31G50	1
Senior Mess. Clk.	E4	36K20	1
Message Clerk	E3	36K20	1
		Total:	3

Equipment:

Nomenclature	Model	Quantity
Launcher, Grenade, 40mm	M203	1
Radio Set	AN/VRC-49	1
Remote Set	AN/GRA-39	1
Telephone	TA-312/PT	2
Truck, Utility, ¼t.	M151	1
TSEC	KY-38	1
TSEC	KYK-28	1

Paragraph 11, Radio Teletype Section
Personnel:

Position	Grade	MOS	Strength
Section Chief	E5	05F40	1
Team Chief	E5	05F40	1
RTT OP	E4	05F20	4
		Total:	6

Table V-4 (cont.)

Equipment:

Nomenclature	Model	Quantity
Generator Set(trlr.Mtd)	-	2
Radio Set	AN/GRC-142	2
Telephone	TA-312/PT	2
Truck, Cargo, 1¼t.	M561	2
TSEC	KW-7	2

Paragraph 12, 3 Wire Sections
Personnel:

Position	Grade	MOS	Strength
Section Chief	E6	36K40	1
Wire Team Chief	E5	36K40	2
SR Tac Wire Op.Sp.	E4	36K20	3
SR Field Swbd. Op.	E4	36K20	1
Field Swbd. Op.	E3	36K20	1
Tac Wire Opns. Sp.	E3	36K20	6
		Total:	14

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	3
Machinegun, 7.62mm	M60	3
Radio Set	AN/PRC-77	2
Switchboard	SB-22/PT	1
Telephone	TA-312/PT	12
Truck, Cargo, 1¼t.	M561	3

Paragraph 13, Operations Section
Personnel:

Position	Grade	MOS	Strength
Fire Dir. Off.	03	51193	1
Battalion S-2	03	59301	1
A.D. Staff Off.	02	01174	1
Operations Sgt.	E8	13E50	1
Intelligence Sgt.	E8	13E50	1
Chief, Fire Dir.	E7	13E40	1
A.D. Staff NCO	E6	16P40	1
Fire Dir. Comp.	E5	13E20	4

Table V-4 (cont.)

Position	Grade	MOS	Strength
SR FADAC Mech.	E5	31B30	1
Chart Operator	E4	13E20	3
FADAC Mech.	E4	31B30	1
Driver/RTO	E3	13B10	3
Clerk Typist	E3	71B30	1
		Total:	20

Equipment:

Nomenclature	Model	Quantity
Carrier, CP	M577	2
FADAC	M18	1
Radio Set	AN/VRC-46	4
Radio Set	AN/VRC-47	2
Remote Set	AN/GRA-39	4
Switchboard	SB-22/PT	2
Telephone	TA-264/PT	2
Telephone	TA-312/PT	10
Truck, Cargo, ¼t.	M561	1
Truck, Cargo, ¼t.	M151	1
TSEC	KY38	4
TSEC	KYK-28	2

Paragraph 14, Liaison Section
Personnel:

Position	Grade	MOS	Strength
Liaison Officer	03	01193	1
Liaison Sgt.	E6	13E40	1
Liaison Sp.	E4	13E20	1
		Total:	3

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	1
Radio Set	AN/VRC-47	1
Remote Set	AN/GRA-39	1
Telephone	TA-312/PT	1
Trailer, Cargo, ¼t.	-	1

Table V-4 (cont.)

Nomenclature	Model	Quantity
Truck, Utility, ¼t.	M151	1
TSEC	KY-38	1
TSEC	KYK-28	1

Paragraph 15, Survey Section Personnel:

Position	Grade	MOS	Strength
Survey Chief	E6	82C40	1
Survey Computer	E5	82C40	2
Instrument Op.	E4	82C20	3
Survey Recorder	E4	82C20	3
		Total:	9

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	1
Machinegun, 7.62mm	M60	1
Radio Set	AN/PRC-77	2
Truck, Cargo, ¼t.	M561	2

Paragraph 16, Medical Section Personnel:

Position	Grade	MOS	Strength
Physician's Asst.	W1	911A0	1
Sect. Sergeant	E6	91B40	1
Sen. Med. Aidman	E5	91B20	1
Battery Aidman	E4	91B20	3
		Total:	6

Equipment:

Nomenclature	Model	Quantity
Truck, Cargo ¼t.(Amb)	M561	1

Table V-5

Field Artillery Battery

Paragraph 01, Battery Headquarters
Personnel:

Position	Grade	MOS	Strength
Battery Commander	03	01193	1
First Sergeant	E8	13Z50	1
Unit Clerk	E5	75B20	1
Lt. Veh. Driver	E3	13B10	1
		Total:	4

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	1
Radio Set	AN/VRC-47	1
Remote Set	AN/GRA-39	1
Telephone	TA-312/PT	1
Truck, Utility, ¼t.	M151	1
TSEC	KY-38	1

Paragraph 02, Firing Battery Headquarters
Personnel:

Position	Grade	MOS	Strength
Exec. Officer	02	01193	1
Chief, Firing Btry	E7	13B40	1
F.A. Recorder	E4	13B10	1
		Total:	3

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	1
Radio Set	AN/VRC-46	1
Telephone	TA-312/PT	2
Trailer, Cargo, ¼t.	-	1
Truck, Utility, ¼t.	M151	1

Table V-5 (cont.)

Paragraph 03, Operations Section
Personnel:

Position	Grade	MOS	Strength
Fire Dir. Off.	02	01193	1
Chief, Fire Dir.	E6	13E40	1
F.D. Computer	E5	13E40	2
Chart Operator	E4	13E20	3
Carrier Driver	E3	13B10	1
		Total:	8

Equipment:

Nomenclature	Model	Quantity
Carrier, CP	M577	1
FADAC	M18	1
Radio Set	AN/VRC-46	2
Remote Set	AN/GRA-39	2
Switchboard	SB-22/PT	1
Telephone	TA-312/PT	4
Truck, Cargo, 1¼t	M561	1
TSEC	KY-38	2
TSEC	KYK-28	1

Paragraph 04, Special Weapons Section
Personnel:

Position	Grade	MOS	Strength
Assembler	E4	13B10	4
		Total:	4

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	1
Telephone	TA-312/PT	2
Trailer, Cargo, 1½t	-	1
Truck, Shop Van, 2½t	M109A3	1

Table V-5 (cont.)

Paragraph 05, 4 Howitzer Sections
Personnel:

Position	Grade	MOS	Strength
Section Chief	E6	13B40	4
Gunner	E5	13B40	4
Asst. Gunner	E4	13B20	4
Carrier Driver	E4	13B10	4
Howitzer Driver	E4	13B10	4
Cannoneer	E3	13B10	32
		Total:	52

Equipment:

Nomenclature	Model	Quantity
Carrier, Cargo, 6t.	M548	4
Howitzer, 8", SP	M110	4
Machinegun, .50 cal.	M2	4
Machinegun, 7.62mm	M60	4
Telephone	TA-312/PT	4

Paragraph 06, Air Defense Team
Personnel:

Position	Grade	MOS	Strength
Redeye Team Chief	E5	16P40	1
RedeyeGunner	E4	16P20	1
		Total:	2

Equipment:

Nomenclature	Model	Quantity
Radio Set	AN/PRC-77	1

Paragraph 07, Support Platoon Headquarters
Personnel:

Position	Grade	MOS	Strength
Platoon Leader	02	01193	1
Supply Sgt.	E5	76Y40	1

Table V-5 (cont.)

Position	Grade	MOS	Strength
Armoror	E4	76Y30	1
Lt. Veh. Driver	E3	13B10	1
		Total:	4

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	1
Radio Set	AN/VRC-46	1
Trailer, Water, 400 gal.	-	1
Truck, Cargo, 2½t.	M35A2	1
Truck, Utility, ¼t.	M151	1

Paragraph 08, Ammunition Section
Personnel:

Position	Grade	MOS	Strength
Section Chief	E6	13B40	1
SR Hvy. Veh. Driver	E5	64C30	1
Hvy Veh. Driver	E4	64C30	3
Ammo Handler	E3	13B10	8
		Total:	13

Equipment:

Nomenclature	Model	Quantity
Launcher, Gren., 40mm	M203	2
Machinegun, 7.62mm	M60	2
Truck, Cargo, 8t.	M520	4

Paragraph 09, Maintenance Section
Personnel:

Position	Grade	MOS	Strength
Motor Sergeant	E6	63C40	1
SR Track Veh. Mech.	E5	63C40	1
Track Veh. Mech.	E4	63C20	3
Trt. Arty. Mech.	E4	13B30	2
Equip. Maint. Clerk	E4	71T20	1

Table V-5 (cont.)

Position	Grade	MOS	Strength
FII Clerk	E4	76S20	1
Generator Mech.	E4	52B20	1
Mech. Helper	E3	63A10	1
		Total:	11

Equipment:

Nomenclature	Model	Quantity
Machinegun, 7.62mm	M60	1
Trailer, Cargo, 1½t.	-	1
Truck, Cargo, 2½t.	M35A2	1

Paragraph 10, Communications Section
Personnel:

Position	Grade	MOS	Strength
Commun. Chief	E6	31G40	1
Radio Tm. Chief	E5	05F40	1
RTT Operator	E4	05F40	2
SR Tac. Wire Opns.Sp.	E4	36K20	1
Tac. Wire Opns. Sp.	E3	36K20	2
		Total:	7

Equipment:

Nomenclature	Model	Quantity
Generator Set (trlr. Mtd.)	-	1
Radio Set	AN/GRC-142	1
Radio Set	AN/PRC-77	1
Telephone	TA-312/PT	5
Truck, Cargo, 1¼t.	M561	3

Paragraph 11, Mess Section
Personnel:

Position	Grade	MOS	Strength
Dining Fac. Mgr.	E7	94B40	1
First Cook	E6	94B20	1

Table V-5 (cont.)

Position	Grade	MOS	Strength
First Cook	E5	94B20	1
Cook	E4	94B20	2
Cook's Helper	E3	94B10	1
		Total:	6

Equipment:

Nomenclature	Model	Quantity
Trailer, Cargo, 1½t.	-	1
Truck, Cargo, 2½t.	M35A2	1

NOTES

NOTES

Chapter I

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